

CLAIMS

WHAT IS CLAIMED IS:

1 1. A Web Services push gateway for interfacing Web Services push
2 applications and mobile terminals operable with one of a plurality of different mobile
3 push technologies, the Web Services push gateway comprising:
4 a Web Services endpoint to terminate Web Services protocols utilized
5 by the Web Services push applications in providing push messages;
6 a plurality of mobile push bearers each configured to communicate
7 with a different one of the plurality of mobile push technologies; and
8 a push router coupled to the Web Services endpoint to receive the
9 push messages, and coupled to the mobile push bearers to forward the push
10 messages to an elected one of the mobile push bearers for ultimate delivery to a
11 recipient mobile terminal employing a mobile push technology corresponding to the
12 elected mobile push bearer.

1 2. The Web Services push gateway as in Claim 1, further comprising a
2 presence agent coupled to the push router to provide the push router with recipient
3 presence information including the recipient mobile terminal's online status and
4 mobile terminal characteristics, wherein the push router's election of the elected one
5 of the mobile push bearers is based at least in part on the recipient presence
6 information.

1 3. The Web Services push gateway as in Claim 1, further comprising a
2 user preference agent coupled to the push router to provide the push router with
3 particular user preferences identified by the user of the recipient mobile terminal,
4 wherein the push router's election of the elected one of the mobile push bearers is
5 based at least in part on the user preferences.

1 4. The Web Services push gateway as in Claim 1, further comprising a
2 push adaptation layer coupled to the plurality of mobile push bearers to collect

3 bearer characteristics from each of the mobile push bearers, wherein the push
4 router's election of the elected one of the mobile push bearers is based at least in
5 part on the bearer characteristics.

1 5. The Web Services push gateway as in Claim 1, further comprising a
2 storage buffer to store one or more of the push messages if the push messages are
3 not to be immediately sent, wherein a decision to store the one or more push
4 messages is based on at least one of recipient presence information, user
5 preferences, and bearer characteristics.

1 6. The Web Services push gateway as in Claim 1, wherein the Web
2 Services endpoint comprises a transport layer server for terminating the Web
3 Services protocols.

1 7. The Web Services push gateway as in Claim 6, wherein the transport
2 layer server is an HTTP server.

1 8. The Web Services push gateway as in Claim 1, wherein the Web
2 Services endpoint comprises an Extensible Markup Language (XML) messaging
3 engine to parse incoming requests associated with the push messages.

1 9. The Web Services push gateway as in Claim 8, wherein the XML
2 messaging engine comprises a Simple Object Access Protocol (SOAP) engine.

1 10. The Web Services push gateway as in Claim 1, wherein the Web
2 Services endpoint comprises a registry interface to interface with a service registry
3 to advertise its push service.

1 11. The Web Services push gateway as in Claim 1, further comprising a
2 presence agent coupled to the push router to provide the push router with recipient
3 presence information including the recipient mobile terminal's online status and
4 mobile terminal characteristics.

1 12. The Web Services push gateway as in Claim 1, further comprising a
2 user preference agent coupled to the push router to provide the push router with
3 particular user preferences identified by the user of the recipient mobile terminal.

1 13. The Web Services push gateway as in Claim 12, wherein the user
2 preferences agent comprises a preference repository to store the user preferences
3 for each potential push message recipient.

1 14. The Web Services push gateway as in Claim 12, further comprising a
2 user preference interface coupled to the user preference agent to allow the user of
3 the recipient mobile terminal to enter and/or modify the user preferences.

1 15. The Web Services push gateway as in Claim 14, wherein the user
2 preference interface is an HTTP server in which the user of the recipient mobile
3 terminal accesses via a web browser.

1 16. The Web Services push gateway as in Claim 1, further comprising a
2 push adaptation layer coupled to the plurality of mobile push bearers to collect
3 bearer information from each of the mobile push bearers, and coupled to the push
4 router to receive and direct the push messages to the elected one of the mobile
5 push bearers for ultimate delivery to the recipient mobile terminal.

1 17. The Web Services push gateway as in Claim 1, wherein at least one of
2 the mobile push bearers is a Short Message Service (SMS) bearer for connecting to
3 a Short Message Service Center (SMSC).

1 18. The Web Services push gateway as in Claim 1, wherein at least one of
2 the mobile push bearers is a Wireless Application Protocol (WAP) Push bearer for
3 connecting to a WAP Push Proxy Gateway (PPG) using the WAP Push Access
4 Protocol (PAP).

1 19. The Web Services push gateway as in Claim 1, wherein at least one of
2 the mobile push bearers is a Wireless Application Protocol (WAP) Push bearer for
3 connecting to the recipient's mobile terminal via the WAP Push Over-the-Air (POTA)
4 protocol.

1 20. The Web Services push gateway as in Claim 1, wherein at least one of
2 the mobile push bearers is a Multimedia Messaging Service (MMS) bearer for
3 communicating multimedia push messages via a WAP MMS protocol.

1 21. The Web Services push gateway as in Claim 1, wherein at least one of
2 the mobile push bearers is a Session Initiation Protocol (SIP) bearer to send the
3 push messages via the SIP protocol.

1 22. A network system for communicating push messages, comprising:
2 one or more mobile terminals capable of receiving push messages via
3 one of a plurality of mobile push technologies;
4 one or more Web Services applications capable of providing the push
5 messages via Web Services protocols; and
6 a Web Services push gateway for interfacing the push messages
7 provided by the Web Services applications to any of the plurality of mobile push
8 technologies.

1 23. The network system as in Claim 22, wherein the Web Services push
2 gateway comprises:
3 a first interface to receive the push messages via the Web Services
4 protocols from the Web Services applications;
5 a plurality of different push bearers, each capable of transmitting the
6 push messages to a recipient mobile terminal via a respective mobile push
7 technology; and
8 a push message router coupled to receive the push messages from
9 the first interface, to process bearer criteria and designate one of the mobile push
10 bearers for transmitting the push messages in response thereto, and to route the

11 push messages to the designated mobile push bearer for ultimate transmission to
12 the recipient mobile terminal using the respective mobile push technology.

1 24. A method of facilitating the transmission of push messages to mobile
2 terminals which collectively implement a plurality of different mobile push
3 technologies, the method comprising:

4 providing a first gateway interface to a Web Services domain, wherein
5 the Web Services domain comprises at least one Web Service push application that
6 transmits at least one push message;

7 providing a second gateway interface to a mobile push technologies
8 domain, wherein the mobile push technologies domain comprises one or more
9 mobile terminals each operable with at least one of the mobile push technologies;

10 routing the push message received at the first gateway interface to an
11 elected one of a plurality of mobile push bearers; and

12 transmitting the push message from the elected mobile push bearer to
13 a recipient mobile terminal via the second gateway interface, wherein the push
14 message is transmitted utilizing the mobile push technology provided by the elected
15 mobile push bearer.

1 25. The method of Claim 24, further comprising converting the push
2 message received at the first gateway interface from a Web Service protocol to a
3 mobile push protocol associated with the elected mobile push bearer.

1 26. The method of Claim 24, further comprising processing bearer election
2 criteria to identify the mobile push bearer to be elected to transmit the push
3 message via the second gateway interface.

1 27. The method of Claim 26, wherein processing bearer election criteria
2 comprises processing recipient presence information including the recipient mobile
3 terminal's online status and mobile terminal characteristics.

1 28. The method of Claim 26, wherein processing bearer election criteria
2 comprises processing user preferences identified by the user of the recipient mobile
3 terminal.

1 29. The method of Claim 26, wherein processing bearer election criteria
2 comprises processing bearer characteristics from each of the mobile push bearers.

1 30. The method of Claim 29, wherein the bearer characteristics comprise
2 one or more of bearer bandwidth, content capability, bearer availability, bearer
3 latency, delivery assurance, and quality of service.

1 31. The method of Claim 24, further comprising parsing the push message
2 at the first gateway interface.

1 32. The method of Claim 24, further comprising processing message
2 transmission parameters to identify transmission guidelines for transmitting the push
3 message from the elected mobile push bearer.

1 33. The method of Claim 32, further comprising buffering the push
2 message prior to transmitting the push message from the elected mobile push
3 bearer, when processing the message transmission parameters reveals
4 postponement of the push message transmission.

1 34. The method of Claim 24, further comprising providing a delivery report
2 to the Web Service push application that initiated the push message, after the push
3 message has been transmitted to the recipient mobile terminal.

1 35. A method of facilitating the transmission of push messages to mobile
2 terminals utilizing a plurality of different mobile push technologies, the method
3 comprising:
4 receiving the push messages from Web Services applications via Web
5 Services protocols;

6 obtaining presence information relating to the availability and type of
7 recipient mobile terminal;

8 obtaining user preference information relating to particular user
9 preferences identified by the user of the recipient mobile terminal;

10 obtaining bearer availability and capabilities information for each of a
11 plurality of different mobile push bearers each capable of communicating with the
12 mobile terminals using a different mobile push technology;

13 selecting a mobile push bearer to transmit the push message to the
14 recipient mobile terminal based on one or more of the presence information, user
15 preference information, and bearer availability and capabilities information; and

16 delivering the push message from the selected mobile push bearer to
17 the recipient mobile terminal using the mobile push technology provided by the
18 selected mobile push bearer.

1 36. The method of Claim 35, wherein selecting a mobile push bearer
2 comprises determining a closest match of the bearer availability and capabilities
3 information with one or more of the presence information and the user preference
4 information.

1 37. The method of Claim 35, wherein selecting a mobile push bearer
2 comprises determining a weighted match of the bearer availability and capabilities
3 information with one or more of the presence information and the user preference
4 information.

1 38. The method of Claim 37, further comprising providing feedback
2 regarding the quality of the selection of the mobile push bearer.

1 39. The method of Claim 35, wherein obtaining presence information
2 comprises querying for information indicative of whether the recipient mobile
3 terminal is currently online.

1 40. The method of Claim 35, wherein obtaining presence information
2 comprises querying for terminal type characteristics of the recipient mobile terminal.

1 41. The method of Claim 35, wherein obtaining user preference
2 information comprises querying for terminal preferences indicative of a range of
3 mobile terminals available as the recipient mobile terminal.

1 42. The method of Claim 41, wherein querying for terminal preference
2 information further comprises querying for content types for each of the mobile
3 terminals available as the recipient mobile terminal.

1 43. The method of Claim 35, wherein obtaining user preference
2 information comprises querying for network preferences indicative of a type of
3 network the user is currently operating within.

1 44. The method of Claim 35, wherein obtaining user preference
2 information comprises querying for presence preferences indicative of user activities
3 at any given time.

1 45. A network system for facilitating the transmission of push messages to
2 mobile terminals which collectively implement a plurality of different mobile push
3 technologies, the network system comprising:

4 first interface means for interfacing to a Web Services domain,
5 wherein the Web Services domain comprises at least one Web Service push
6 application that transmits at least one push message;

7 second interface means for interfacing to a mobile push technologies
8 domain, wherein the mobile push technologies domain comprises one or more
9 mobile terminals each operable with at least one of the mobile push technologies;

10 means for routing the push message received via the first interface

11 means to an elected one of a plurality of mobile push bearers; and

12 means for transmitting the push message from the elected mobile

13 push bearer to a recipient mobile terminal via the second interface means, wherein

14 the push message is transmitted utilizing the mobile push technology provided by
15 the elected mobile push bearer.

1 46. A computer-readable medium having computer-executable instructions
2 for facilitating the transmission of push messages to mobile terminals utilizing a
3 plurality of different mobile push technologies, the computer-executable instructions
4 performing steps comprising:
5 receiving the push messages from Web Services applications via Web
6 Services protocols;
7 collecting one or more of presence information relating to the
8 availability and type of recipient mobile terminal, user preference information relating
9 to particular user preferences identified by the user of the recipient mobile terminal,
10 and bearer availability and capabilities information for each of a plurality of different
11 mobile push bearers each capable of communicating with the mobile terminals
12 using a different mobile push technology;
13 selecting a mobile push bearer to transmit the push message to the
14 recipient mobile terminal based one or more of the presence information, user
15 preference information, and bearer availability and capabilities information; and
16 delivering the push message from the selected mobile push bearer to
17 the recipient mobile terminal using the mobile push technology provided by the
18 selected mobile push bearer.